Diagonally twisted sole

The present invention relates to a diagonally twisted sole according to the preamble of Patent Claim 1.

Patent number WO 01/15560 A1 states the following: "The human being with his highly complicated ligament-muscle-tendon system and the sensitive, upright spinal column is built so that in nature he can advance on uneven ground. For thousands of years the human being has used and maintained his body in accordance with this natural condition." In said patent application, the shape and configuration of the midsole and of the sole of the shoe are described in detail. Studies have been carried out on the described inserts in the sole. The results and conclusions of these studies have led to the present patent application.

Tests and observations show that a natural movement follows more or less the following sequence. When the heel is placed on the ground, the foot rests on the outer edge of the heel. The foot then rolls inwards at an angle to the direction of walking, until pushing off again from the ball of the foot and large toe oriented towards the centre between the two feet. The load placed on the sole of the foot moves across the diagonal thereof. From the heel, which is loaded outside, the line of loading moves diagonally inwards across the sole of the foot all the way to the ball of the foot and the large toe.

This is so is also confirmed by the footprint of a healthy person. A childs footprint is still often correct since the heel, the outer edge of the foot and the whole ball of the foot together with the toes can be seen in a footprint, but not the area below the instep. Older people often have other footprints that result from incorrect posture and incorrect heel-to-toe movement of the feet.

In a civilized population, accustomed for generations to wearing shoes from early childhood, a deformation of the feet can be seen from the following feature: The large toe is directed outwards away from the centre line between the two feet. It is also known that, in primitive tribes, the large toe is always oriented towards the centre line between the two feet. The reason for this must be that the large toe, in this position, is better able to support the ball of the foot when pushing off.

This twisting of the load exerted on the foot is not found in the population of civilized societies accustomed to shoes and to hard and flat surfaces. When walking on flat surfaces, the flat sole forces the foot into a straight heel-to-toe movement. The lateral load changes and the rolling movement in the lateral direction becomes negligible over time. This false rolling movement has to be compensated by knee joints and hip joints and also by the spinal column, and this in turn has the consequence that the whole system of locomotion is incorrectly loaded because of the incomplete rolling of the feet. As a result of this, our society suffers form all kinds of posture-related conditions with painful arthrosis and problems of the spinal column.

The present invention now has the object of correcting the incorrect placement of the heel and incorrect heel-to-toe movement during walking in such a way that the natural rolling movement with a diagonal load curve of the soles of the feet is gently enforced and the natural and dynamic movements and loads of the knee joints and hip joints and of the spinal column are gently enforced during walking.

This object is achieved by a diagonally twisted sole with the features of Patent Claim 1. Further features

according to the invention are set forth in the dependent claims, and their advantages are explained in the description below.

In the drawing:

Fig. 1 shows the structure of the shoe,

Fig. 2 shows a theoretical side view of a diagonally twisted sole,

Fig. 3 shows a theoretical front view of a diagonally twisted sole,

Fig. 4 shows the left shoe,

Fig. 5 shows a cross section through the toe part of the left shoe,

Fig. 6 shows a cross section in the middle third of the left shoe,

Fig. 7 shows a cross section through the heel part of the left shoe,

Fig. 8 shows a cross section through the toe part of the right shoe,

Fig. 9 shows a cross section in the middle third of the right shoe,

Fig. 10 shows a cross section through the heel part of the right shoe,

Fig. 11 shows the right shoe,

Fig. 12 shows the left shoe,

Fig. 13 shows a cross section through the toe part of the left shoe, the twisted plate and hard inclusion,

Fig. 14 shows a cross section in the middle third of the left shoe, the twisted plate and hard inclusion,

Fig. 15 shows a cross section through the heel part of the left shoe, the twisted plate and hard inclusion,

Fig. 16 shows a cross section through the toe part of the right shoe, the twisted plate and hard inclusion,

Fig. 17 shows a cross section in the middle third of the right shoe, the twisted plate and hard inclusion,

Fig. 18 shows a cross section through the heel part of the right shoe, the twisted plate and hard inclusion,

Fig. 19 shows the right shoe.

The drawings show preferred embodiments illustrated by the following description.

Patent specification WO 01/15560 A1 describes (Fig. 1) how various types of loading of the foot can be achieved by means of hard inserts 15 in the undersole 12. The main focus there was on specific therapeutic measures that could be achieved with this type of sole 3 and shoe 1. It has now been found that what was described in the above introduction holds true in general terms: Particularly in persons suffering from pain in the knees, hips or back, the line of loading of the foot no longer runs diagonally across the foot

during walking. One "treads" forward, so to speak, and in so doing places a weight on the foot with a line of loading that runs in the direction of walking. As a result, knee joints and hip joints are always loaded at the same points. The completely dynamic movement during walking is absent. This leads to painful attrition and in many cases to arthrosis.

The shoe 1 depicted in Fig. 1, or the sole 3 thereof, already allows the desired line of loading to be adopted by means of arranging different types of inserts 15 of differing hardness on the midsole bottom 11. This possibility is made possible by the undersole 12 having a sand-like elasticity. By this measure alone, therefore, a diagonal or freely definable form of the line of loading can be established.

It has now been shown that the undersole 12 is advantageously formed against the sole bottom 13 such that the latter assumes the diagonally twisted form depicted theoretically in Fig. 2 and Fig. 3. In these views, the twisting is very distinct, in order to illustrate the concept of the invention. In practice, the twisting, indicated by angle α in the toe area Z and designated by angle β in the heel area A, with respect to the horizontal H will amount to a few degrees. Moreover, the twisting of the sole bottom 13 is always adapted to the requirements of the patient and freely configured. In special cases, it is conceivable for it not to be systematically twisted, but instead to be adapted to a deformity, incorrect position or impediment of the foot.

For aesthetic reasons, it will be sought to keep the outward appearance of the shoe as normal as possible. The above-described configuration does not permit this, and, instead, the shoe is very unstable on a surface and is clearly different in appearance from a normal shoe. Fig. 12 to Fig. 19 show how the same effect can

be achieved if a twisted plate 16 is built into the soft undersole 12 instead of individual hard inserts 15. The sole bottom 13 will then be parallel with the horizontal H, as is shown in Fig. 13 to Fig. 18. This twisted plate 16 will be hard and will either be completely stiff or elastically flexible and will be connected to the midsole bottom 11. The space between midsole bottom 11 and sole bottom 13 is filled by the combination of the twisted plate 16 and the undersole 12 of sand-like elasticity. The twisted plate 16 and the undersole 12 together form a resilient midsole 12, 16.

The twisted plate can be shaped in different ways. If the planes of the midsole bottom 11 and of the sole bottom 13 transverse to the walking direction are parallel, the twisted plate, as shown in Figures 13, 15, 16 and 18, will have different thicknesses across its surface. The resilient midsole 12, 16 is then harder at the places of great thickness of the twisted plate 16 (e.g. Fig. 16, right) and softer at thin places thereof (e.g. Fig. 16, left).

The flat twisted plate 16, as shown in Figures 2 and 3, is either connected to the sole bottom 13, as is shown for example in Figures 5, 6, 7, 8, 9, 10, or it is connected to the midsole bottom 11, which then assumes the form of the twisted plate.

With the present invention, it is possible to help patients suffering from a wide variety of posture-related problems, by providing them with shoes which are adapted to the condition from which they are suffering and which are designed for daily use. The major advantage of this is that the patients do not have to perform any exercises or special gymnastics, but instead are treated by wearing these shoes on a daily basis.